Electronic Charts 101

By Fred Ganjon, IIC Technologies, Inc.

Thank you, Larry. Time is short, and I was asked to set the stage. So what I've got here is an introductory course, Electronic Charts 101.

Just quickly I did a bit of research on this over the last couple of years. And as near as I can tell, the first systems that used the concepts that we consider to be electronic charting came about in 1979 and 1980 in a couple of different places.

These early systems were monochrome. They weren't very fancy, but they had many of the ideas that we see today. And within just a few years, they had developed full-color displays and integrated with positioning systems. In those days the positioning was from LORAN and radar.

We actually had the basic concepts of ECDIS, and by 1984 we had radar integrated with this technology. And then, about 1984 there was just a plethora of other companies that popped up, big companies and little companies operating out of somebody's garage that went from two or three people making a system to a couple dozen, and some of those are even here today.

In 1986 the international community first started looking at standards. The international maritime community and the international hydrographic community got together with the North Sea Hydrographic Commission, I believe in February,1986, and decided that this is something that needed to be looked at in terms of uniform international standards.

Here in the U.S. The Radio Technical Commission for Maritime Services, RTCM, established a committee to take a look at standards for this technology. The RTCM Committee met for the first time in June, 1986.

In 1989 the formal IMO process started. And in 1995 IMO adopted a standard that was considered to be the world standard for SOLAS class shipping. So, that's really pretty fast.

And now here we are in 2002, and we are looking at the benefits of all this work that has gone on before. I hate to do this to you, but I'm going to give you some definitions.

And the reason I'm doing this is if you understand the definitions, you understand the terminology that's going to be flipped around by the manufacturers, and I think it's useful.

ECDIS, Electronic Chart Display and Information System -- This is the system that is defined by the IMO standard. And it means a navigation information system which with adequate back-up arrangements can be accepted as complying with the up-to-date chart required by Regulation V/20 of the SOLAS Convention by displaying selected

information from a system electronic navigational chart with positional information from navigation sensors to assist the mariner in route planning and route monitoring and by displaying additional navigation-related information.

Let me cut to the chase. You have to have adequate back-up arrangements. You have to have information (data) from an electronic navigational chart (ENC). You have to have positional information such as provided by GPS, and it only applies to SOLAS class vessels. You're not dealing with SOLAS here on the river. Therefore, in a way you don't have to worry about it, but this is the international standard and it's worth understanding. You have to be connected to navigation centers. In today's world that's GPS.

System Electronic Navigational Chart. This SENC was mentioned in that last definition. So what's an SENC? It means the database resulting from the transformation of the ENC by the ECDIS system. It is the database that is actually accessed by ECDIS for the display generation and other navigational functions, and it is the equivalent to an up-to-date paper chart.

Electronic Navigational Chart. ENC -- I'm sorry, all these definitions tend to collapse on each other. Electronic Navigation Chart. This means the database standardized as to content, structure, and format issued for use with ECDIS on the authority of a government-authorized hydrographic office.

The ENC contains all the chart information necessary for safe navigation, and it may contain supplemental information in addition to that contained on the paper chart such as sailing directions, which may be considered necessary for safe navigation.

Okay. This is the fuel. This is the data on which the system runs. What's the difference between the ENC and the SENC? It's assumed that many of the systems will not use the ENC directly. They have to take it and digest it, transform it within the system to some internal format. That's the SENC that I just talked about before.

When Tony gets up and does his bit, he's going to deal with the ENC that the Corps is going to produce.

Okay, to summarize a bit. ECDIS. In order to meet the standard for ECDIS, the system has to be type-approved based on these IMO standards. It has to be connected to navigation sensors, has to have adequate back-up, has to use an official database that is up-to-date with the proper content and structure and format.

Now if it doesn't do all of this, it's not an ECDIS. And everything that's not an ECDIS is called an Electronic Chart System, an ECS.

The good news is there are a lot of these systems out there, and they're really quite good. And for the most part, that's what you're dealing with on the river.

After IMO created the performance standards for ECDIS, they were asked by several countries to create performance standards for ECS.

Initially they said no. Well, when they were working on the ECDIS standard, they kept saying wait until this is done, wait until this is done. We'll do ECDIS now, then we'll do the ECS later.

After the ECDIS performance standard was actually completed, IMO came back and said, you know, we really don't want to do this because it doesn't deal with SOLAS. It has to be ECDIS in order for SOLAS to use it. So, we have no interest in dealing with ECS as a stand-alone piece of equipment, and they just walked away from it.

RTCM at that point decided to pick this up and start working on performance standards for ECS. It's not unusual for RTCM to do this.

And, in fact, in 1986 before IMO actually started on the ECDIS performance standard, RTCM had worked on a standard. And that initial effort by RTCM ended up being turned over to IMO back in 1989 as one of their starting points.

So, RTCM came back to it and said okay, we will work on this performance standard for ECS. And we will do it on the basis of what we see here in the United States, but we'll accept input from other countries as well if they are interested. That's just a bit of history.

The Special Committee 109 for Electronic Charts was established in 1986. The present document that we're working with is the RTCM Recommended Performance Standard for ECS, Draft Version 3.0.

It's important to note that RTCM is being supported in this effort by U.S. Coast Guard, NOAA, the Italian Hydrographic Office, and several ECS manufacturers.

It's noteworthy that the Italian Hydrographic Office is involved This is a hydrographic office from over in Europe that has a requirement for ECS standards. They looked around to see who was doing anything with ECS and they determined that RTCM was basically the only game in town. They elected to participate with us, and it's been a useful association.

Now, why is the Coast Guard, for instance, interested in this? Very specifically, without putting the lieutenant on the spot here, Captain Ross several years ago came to us at RTCM and said, "Look, as we move toward the implementation of AIS, the requirements that are likely to go in place will require ships in certain port areas to carry AIS transponders."

"The requirement will be to broadcast the information. The requirement probably will not include actually collecting the information from other vessels and viewing it."

"However, when a master is on his bridge, and he knows that all these other ships around him are providing information about their location, their speed, etc., if he knows that's available, why wouldn't he want to look at it?"

And, in fact, most of them are very interested in seeing this AIS information.

The question is what is he going to use to look at it ? What type of device is out there that can collect this AIS information and display it?

And it turns out that an electronic chart system is one of the ideal viewers for AIS information. ECDIS would be ideal. But if a ship doesn't have an ECDIS, do they really want to invest all the money that's necessary for a full-blown ECDIS? Why not just an ECS?

And so the Coast Guard was determined to have that option available. And in order for Coast Guard to consider the use of ECS as an AIS display device, they had to have something that they could type-approve. Therefore, they needed standards. And that is the primary reason why the Coast Guard has been so involved in the development of these RTCM standards.

NOAA has also been involved. From the data side, NOAA felt it was very important for them to be involved to determine what kind of data would be required in the ECS systems.

Okay, just summarizing quickly. What does this version 3.0 include? Note that I haven't talked about 1.0 and 1.1 and 2 and 2.1. This is an evolving process, and we are presently at 3.0.

We provide for three categories of ECS. Category 1 is for larger ships, and it has the most functionality and the toughest requirements. And we have harmonized this with the IMO ECDIS performance standard to the point that a category 1 system under this standard could be used as a back-up for ECDIS.

Without going into all the implications there, it is important to know that, if this process comes to a projected conclusion, then an ECS could actually end up being a back-up for ECDIS, and that's very useful.

Category 3 is really intended to be done at the recreational end, and category 2 is in between those two. The performance standard provides for not only the system requirements and the requirements for the display of database, it also provides test requirements.

So in this one document, we have a complete version of how you take an ECS system, look at it for the performance requirements and the data requirements, and then look at it in terms of how do you determine if it really meets all these other requirements; what tests are necessary.

For instance, in the case of ECDIS, the IMO performance standard is accompanied by an IEC test standard, and an IHO data standard. So, you have to go to at least three different places to come up with all the same information.

Time is short, and I'm not taking any questions. If there's time at the end – okay. I hope this has been useful. When this session is over, we have some manufacturers that are going to show you their systems. Hold their feet to the fire. Don't let them tell you that it's an ECDIS if you think it's not an ECDIS.   Go back to the definition.